4. A Frog with symmetrically Abnormal Hind Feet.

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(Text-figure 1.)

Among the specimens used for the teaching of elementary zoology at this College, there was recently found an example of the Common Frog (*Rana temporaria*) in which both the hind feet showed a curious and interesting variation. A photograph of the external appearance of the two hind feet is given (text-fig. 1, A), which clearly shows that on neither foot do five functional digits exist; though in both cases a small calcar, or pre-hallux, as it is often called, is present in its normal position in addition to four well-developed and normal toes.

The fact that certain of the toes always present definite characteristics which enable them to be indubitably identified, quite apart from their actual numerical position in the series, renders it quite easy to determine the identity of the digits still present in the four-toed specimen. Of these characteristics the most obvious distinguishes the fourth toe, which is not only longer than any of the others, but also always possesses four phalanges, which is one more than the number present in any other digit. In the specimen under discussion four phalanges can be distinguished on one toe on each hind foot, so that this toe is thus marked out as the fourth of the original series, and from this it can be immediately determined that the missing digit is in each case the first. This identification of the digits is shown on the photograph.

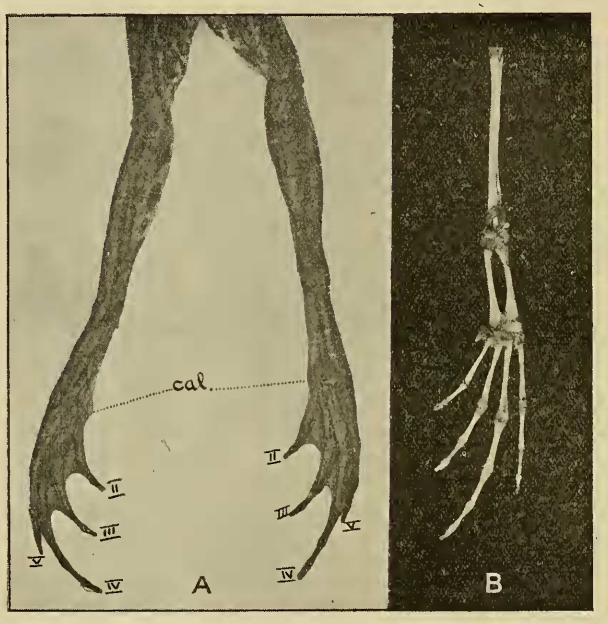
In view of the possibility, however unlikely, that symmetrical mutilation of both hind feet might have occurred, one foot, the left, has been completely dissected, and the dissection has shown that the abnormality cannot be due to injury, for the first digit is unrepresented by any tissue whatever.

During the dissection great care was exercised to determine whether the muscles of the hallux were represented, and no trace whatever of them was found, either in the form of small muscle-masses or of fragments of muscular tissue or tendons, such as would inevitably be left had the toe been bitten off or otherwise amputated. The musculature of digit II (and of all the other digits) was perfectly normal, and showed no signs of the inclusion of muscles really belonging to digit I. Specially important is the fact that from the *aponeurosis plantaris* only four *tendines superficiales* arise, the one normally associated with the first digit being totally absent. There is also no trace of any of the bones

of the hallux in the skeleton of the foot, nor any gap between the calcar and digit II from which the hallux might have been removed, and these facts taken together do away completely with any possibility that the abnormality is due to injury. A photograph (text-fig. 1, B) is given of the skeleton.

All the normal distal tarsal bones are present in the foot in their normal position, though, unfortunately, they are not distinguishable in the figure; the four digits present are also perfectly normal in their anatomy.

Text-figure 1.



A. Photograph of the external appearance of the two hind feet, natural size.

B. Photograph of the skeleton of the left hind foot, natural size.

It was decided not to dissect the right foot, but as careful an examination as possible was made from the outside, and revealed no indication of the hallux in that foot either.

One question I cannot definitely settle. It is just possible that the structure identified by me as the calcar is really the remnant of the hallux, in which case the calcar is entirely absent in both feet. I do not think that this can be the case, however, for the following reasons. The position of this structure in the abnormal specimen precisely corresponds to that of the calcar in the normal frog, both as regards the foot generally and in its

relation to the distal tarsal bones: its size is just that of the normal calcar; and, in addition, in dissecting the foot I found that its muscles corresponded exactly with the account given in Gaupp's Ecker-Wiedersheim's 'Anatomie des Frosches' for the musculature of the calcar.

One of the most interesting points in connexion with this abnormality is the fact that in the manus of the frog there are always only four digits, and the one usually accounted absent is again the first of the series, though Emery (Anat. Anz. Bd. v. 1890, pp. 283–288; and elsewhere) has claimed that the missing finger is really the fifth. But whether the absence of the first digit from the hind feet of the abnormal specimen can be regarded as additional evidence tending to disprove Emery's theory, or not, I cannot say. Another point of theoretical interest lies in the presence of the calcar despite the absence of the hallux, which seems to me to afford considerable support to the view that the former does not belong in any way to the digital series. Theoretical considerations based upon a single specimen are far too doubtful, however, to render it worth while attempting to discuss these questions.

Among the great number of structural abnormalities which have been described for frogs of various species, a number of cases of polymely and polydactyly occur; but apparently this specimen is the first in which a variation of this kind has been recorded.